

ABSTRACT OF THE DISCLOSURE

A method and system for finding the position of a mobile unit with respect to the satellites of a satellite network such as the Global Positioning System and with respect to the base stations of a wireless communications network. Each satellite transmits a signal that consists of a series of frames of a pseudonoise sequence. The frames of a signal received from the satellite network by the mobile unit are arranged as columns of a matrix and are processed coherently to provide estimated pseudoranges and estimated rates of change of pseudoranges for in view satellites. The coherent processing includes performing an orthogonal transform on the rows of the matrix, multiplying the elements of the matrix by Doppler compensation factors, and then, for each satellite in view, convolving the columns of the matrix with the pseudonoise sequence of that satellite. Other pseudoranges are inferred from synchronization burst sequences received by the mobile unit from one or more base stations. If the base stations are not mutually synchronized, reference units are provided to determine the time offsets between the base station clocks and the satellite network clock and to transmit these time offsets to the mobile unit, so that all the pseudoranges include the same bias relative to the satellite network clock. The pseudoranges are processed and reconciled by a dynamic estimator that includes a linear optimal estimator such as a Kalman filter, to produce successive estimates of the location of the mobile unit as the mobile unit moves.